ABSTRACT FORM FOR ALL GSA MEETINGS IN 1994

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① TYPE ABSTRACT COMPLETELY WITHIN THE BLUE LINES BELOW. (10 point type minimum)

№ 34108

GRAVITY INVESTIGATION OF THE MANSON IMPACT STRUCTURE, IOWA.

PLESCIA, Jeffrey, California Institute of Technology, Jet Propulsion laboratory, MS 183-501, Pasadena, CA 91109.

The Manson impact Structure (MIS) is located in northwest Iowa at 42° 34.44'N; 94° 33.60'W, has an age of -74 Ma, and diameter of -35 km. MIS is characterized by a central uplift of crystalline rock surrounded by a depression filled with breccia and in turn surrounded by a terraced rim of slumped blocks. MIS is buried by glacial till; hence the geology must be studied through coring and geophysical techniques. Here, results of a gravity survey are reported.

The data base includes a total of 1073 data points covering an area of -65 km (E-W) by 63 km (N-S). Data collected by this study were merged with more limited data of Holtzman (1970). Station spacing is typically 1 mi. (1.6 km) with more dense spacing around the center and less dense data at the survey margins. Reduction was made using a density of 2.57 g cm^{-3}.

Bouguer gravity within the study region is dominated by an asymmetric northeast trending gravity 10W. Typical gradients across most the area are 2.2 mGal km^{-1} decreasing to the southeast. The southeasternmost part of the study area is dominated by a norlheast-trending gravity high. This pattern is easily understood in the context of the regional geology; a southeast thickening section of elastic rocks truncated by the northeast-trending Iowa Horst. The Iowa Horst and gravity high are part of the Mid-Continent Gravity High.

To isolate the gravity signature directly related to MIS; a 5th order polynomial surface was fit to the data and the residuals contoured. The residual gravity shows that the central uplift is dominated by a pair of gravity highs (+4 mGal); beyond this central high is an approximately annular low (-2 to -4 mGal). The residual gravity pattern is complicated by numerous highs and lows associated with density variations within the crystal line basement. The gravity data indicate a complex central uplift, perhaps a pitted central peak; a breccia unit - 3000 m thick surrounding the central uplift, and a diameter of about 35 km.

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